THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A prodrug of the general Formula (I), (II) or (III):

(I)

(II)

(III)

in which

X is a tobramycin moiety;
X' is a pharmaceutically active moiety;
L is a linker group;
Y is a pharmacokinetic regulator; and
n is an integer of 1 or greater
or a pharmaceutically acceptable derivative or salt thereof.

2. A prodrug according to claim 1, in which the pharmaceutically active moiety is selected from an aminoglycoside, nucleoside, rhinovirus capsid-binding compound, antisense oligonucleotide, peptide, an inhibitor of HIVRT, an inhibitor of influenza neuraminidase, amphotericin β, an azole and an aspartic proteinase.

3. A prodrug according to claim 2, in which the aminoglycoside is selected from tobramycin, kanamycin A to C, amikacin, neomycin, streptomycin, neamine, paromomycin, lividomycin, 2230-C, ribostamycin, xyllostasin, butirosin, 4'-deoxybutyrosin, LL-BM408a, gentamycins and nebramycin.

4. A prodrug according to claim 3, in which the aminoglycoside is tobramycin, amikacin, neomycin or kanamycin.

5. A prodrug according to claim 3 or claim 4, in which the aminoglycoside is tobramycin.

6. A prodrug according to any one of claims 1 to 5, in which the linker group is selected from esters, amides, ureas, thioureas, imines, acetals, ethers, phosphates, phosphate esters or diesters, thioesters, oximes and hydrazones.

7. A prodrug according to claim 6, in which the linker group is selected from an ester, amide, oxime and phosphate.

8. A prodrug according to any one of claims 2 to 7, in which the linker group is an ester.

9. A prodrug according to any one of the preceding claims, in which the pharmacokinetic regulator Y is a hydrophobic or hydrophilic moiety.

10. A prodrug according to claim 9, in which the hydrophobic moiety is an optionally substituted straight chain, branched and/or cyclic saturated or unsaturated hydrocarbon.

11. A prodrug according to claim 10, in which the hydrophobic moiety is an optionally substituted alkyl or optionally substituted alkenyl having 1 to 24 carbon atoms which is optionally interrupted with oxygen or nitrogen; optionally substituted aryl; or an optionally substituted heterocyclyl.

12. A prodrug according to claim 11, in which the optionally substituted alkyl or optionally substituted alkenyl is optionally substituted C_{1-20} alkyl or optionally

substituted C_{2-20} alkenyl which is optionally interrupted with O, C=O, NH, optionally substituted aryl or optionally substituted heterocyclyl and optionally substituted with carboxyl, optionally substituted C_{1-6} alkyl, amino or hydroxyl.

13. A prodrug according to claim 11, in which the optionally substituted aryl is an optionally substituted phenyl or optionally substituted biphenyl.

14. A prodrug according to claim 11, in which the optionally substituted heterocyclyl is a 5- or 6-membered nitrogen containing heterocyclic group.

15. A prodrug according to claim 14, in which the heterocyclic group is selected from pyridyl, indolyl, indazolyl, 2,3-dihydro-1H-indolyl, furanyl, isoxazolyl, pyrazolyl and thiofuranyl.

16. A prodrug according to any one of claims 13 to 15, in which the optional substituents on the phenyl or heterocyclyl are selected from halo, C_{1-4} alkyl, C_{1-4} alkoxy, hydroxy and OCF_3.

17. A prodrug according to claim 9, in which the hydrophilic moiety is selected from oligonucleotides up to 20 nucleotides in length, peptides up to 20 amino acids in length, peptide mimics, carbohydrates, oligosaccharides and derivatives thereof.

18. A method for the preparation of the prodrug as defined in any one of claims 1 to17, which comprises the steps of:

(a) optionally protecting the moieties X and/or X' and/or the linker group which is attached to the optionally protected pharmacokinetic regulator Y;

(b) reacting the optionally protected moieties X and/or X' and the optionally protected linker group L

attached to the optionally protected pharmacokinetic regulator Y; and

(c) if necessary, removing the protecting groups of the moieties X and/or X', the linker L and the pharmacokinetic regulator Y.

19. A pharmaceutical formulation comprising the prodrug as defined in any one of claims 1 to 17 or a pharmaceutically acceptable salt or derivative thereof, together with one or more pharmaceutically acceptable carriers.

20. A pharmaceutical formulation according to claim19, which further comprises one or more other therapeutic and/or prophylactic ingredients.

21. A pharmaceutical formulation according to claim20, in which the other therapeutic and/or prophylactic ingredient is an antimicrobial or antiinfective agent.

22. A pharmaceutical formulation according to claim21, in which the antiinfective agent is an antibacterial agent.

23. A pharmaceutical formulation according to claim22, in which the antibacterial agent is used to treat respiratory infections.

24. A pharmaceutical formulation according to claim 22 or claim23, in which the antibacterial agent is a combination of trimethoprim and sulfonamide; bacitracin and polymyxin B-neomycin; imipenem and fluoroquinolone; and beta-lactam and aminoglycosides.

25. An inhaler which comprises a prodrug as defined in any one of claims 1 to 17 or a formulation as defined in any one of claims 19 to24.

26. An inhaler according to claim 25 which is adapted for oral administration as a free-flow powder.

27. An inhaler according to claim 25 which is a metered dose aerosol inhaler.

28. A method for the prevention and/or treatment of a microbial infection comprising the step of administration to a subject in need thereof of an effective amount of the prodrug as defined in any one of claims 1 to 17 or a formulation as defined in any one of claims 19 to24.

29. A method according to claim28, in which the microbial infection is a bacterial infection.

30. A method according to claim29, in which the bacterial infection is a Gram Negative or Gram Positive infection.

31. A method according to claim30, in which the bacterial infection is associated with the respiratory tract, urinary tract or GI tract or a systemic infection caused by enteric bacteria.

32. A method according to any one of claims 28 to 31 in which the administration is to the respiratory tract by inhalation, insufflation or intranasally or a combination thereof.

33. Use of the prodrug as defined in any one of claims 1 to 17 for the manufacture of a medicament for the prevention and/or treatment of a microbial infection.

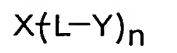
34. Use of the prodrug as defined in any one of claims 1 to 17 in the prevention and/or treatment of a microbial infection.

35. Use of the prodrug as defined in any one of claims 1 to 17 as an antimicrobial agent.

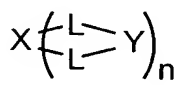
36. A prodrug as defined in any one of claims 1 to 17 or a formulation as defined in any one of claims 19 to 24 for use in the prevention and/or treatment of a microbial infection.

37. A method for the detection of a microbial infection which comprises the step of contacting the prodrug as defined in any one of claims 1 to 17 or the formulation as defined in any one of claims 19 to 24 with a sample suspected of containing the microorganism.

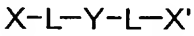
38. A prodrug of general Formula (I), (II) or (III):



(I)



(II)



(III)

in which

X and X′ are either the same or different and selected from an aminoglycoside excluding tobramycin;

L is a linker group excluding amide and carbamate;

Y is a pharmacokinetic regulator; and

n is an integer of 1 or greater

or a pharmaceutically acceptable derivative or salt thereof.

39. A prodrug according to claim 38, in which the aminoglycoside X is selected from kanamycin A to C, amikacin, neomycin, streptomycin, neamine, paromomycin, lividomycin, 2230-C, ribostamycin, xyllostasin, butirosin, 4'-deoxybutyrosin, LL-BM408a, gentamycins and nebramycin.

40. A prodrug according to claim 39, in which the aminoglycoside is amikacin, neomycin or kanamycin.

41. A prodrug according to any one of claims 38 to 40, in which the linker group is selected from esters, ureas, thioureas, imines, acetals, ethers, phosphates, phosphate esters or diesters, thioesters, oximes and hydrazones.

42. A prodrug according to claim 41, in which the linker group is selected from an ester, oxime and phosphate.

43. A prodrug according to claim 41 or claim 42, in which the linker group is an ester.

44. A prodrug according to any one of claims 38 to 43, in which the pharmacokinetic regulator is a hydrophobic or hydrophilic moiety.

45. A prodrug according to claim 44, in which the hydrophobic moiety is an optionally substituted straight chain, branched and/or cyclic saturated or unsaturated hydrocarbon.

46. A prodrug according to claim 45, in which the hydrophobic moiety is an optionally substituted alkyl or optionally substituted alkenyl having 1 to 24 carbon atoms which is optionally interrupted with oxygen or nitrogen; optionally substituted aryl; or an optionally substituted heterocyclyl.

47. A prodrug according to claim 46, in which the optionally substituted alkyl or optionally substituted alkenyl is optionally substituted C_{1-20} alkyl or optionally substituted C_{2-20} alkenyl which is optionally interrupted with O, C=O, NH, optionally substituted aryl or optionally substituted heterocyclyl and optionally substituted with carboxyl, optionally substituted C_{1-6} alkyl, amino or hydroxyl.

48. A prodrug according to claim 46, in which the optionally substituted aryl is an optionally substituted phenyl or optionally substituted biphenyl.

49. A prodrug according to claim 46, in which the optionally substituted heterocyclyl is a 5- or 6-membered nitrogen containing heterocyclic group.

50. A prodrug according to claim 49, in which the heterocyclic group is selected from pyridyl, indolyl, indazolyl, 2,3-dihydro-1H-indolyl, furanyl, isoxazolyl, pyrazolyl and thiofuranyl.

51. A prodrug according to any one of claims 48 to 50, in which the optional substituents on the phenyl or heterocyclyl are selected from halo, C_{1-4} alkyl, C_{1-4} alkoxy, hydroxy and OCF_3.

52. A prodrug according to claim 44, in which the hydrophilic moiety is selected from oligonucleotides up to 20 nucleotides in length, peptides up to 20 amino acids in length, peptide mimics, carbohydrates, oligosaccharides and derivatives thereof.

53. A method for the preparation of the prodrug as defined in any one of claims 38 to 51, which comprises the steps of:

(a) optionally protecting the moieties X and/or X' and/or the linker group which is attached to the optionally protected pharmacokinetic regulator Y;

(b) reacting the optionally protected moieties X and/or X' and the optionally protected linker group L attached to the optionally protected pharmacokinetic regulator Y; and

(c) if necessary, removing the protecting groups of the moieties X and/or X', the linker L and the pharmacokinetic regulator Y.

54. A pharmaceutical formulation comprising the prodrug as defined in any one of claims 38 to 52 or a pharmaceutically acceptable salt or derivative thereof, together with one or more pharmaceutically acceptable carriers.

55. A pharmaceutical formulation according to claim 54, which further comprises one or more other therapeutic and/or prophylactic ingredients.

56. A pharmaceutical formulation according to claim 55, in which the other therapeutic and/or prophylactic ingredient is an antimicrobial or antiinfective agent.

57. A pharmaceutical formulation according to claim 56, in which the antiinfective agent is an antibacterial agent.

58. A pharmaceutical formulation according to claim 57, in which the antibacterial agent is used to treat respiratory infections.

59. A pharmaceutical formulation according to claim 57 or claim 58, in which the antibacterial agent is a combination of trimethoprim and sulfonamide; bacitracin and polymyxin B-neomycin; imipenem and fluoroquinolone; and beta-lactam and aminoglycosides.

60. An inhaler which comprises a prodrug as defined in any one of claims 38 to 52 or a formulation as defined in any one of claims 54 to 59.

61. An inhaler according to claim 60 which is adapted for oral administration as a free-flow powder.

62. An inhaler according to claim 60 which is a metered dose aerosol inhaler.

63. A method for the prevention and/or treatment of a microbial infection comprising the step of administration to a subject in need thereof of an effective amount of the prodrug as defined in any one of claims 38 to 52 or a formulation as defined in any one of claims 54 to 59.

64. A method according to claim 63, in which the microbial infection is a bacterial infection.

65. A method according to claim 64, in which the bacterial infection is a Gram Negative or Gram Positive infection.

66. A method according to claim 65, in which the bacterial infection is associated with the respiratory tract, urinary tract or GI tract or a systemic infection caused by enteric bacteria.

67. A method according to any one of claims 63 to 66 in which the administration is to the respiratory tract by inhalation, insufflation or intranasally or a combination thereof.

68. Use of the prodrug as defined in any one of claims 38 to 51 for the manufacture of a medicament for the prevention and/or treatment of a microbial infection.

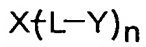
69. Use of the prodrug as defined in any one of claims 38 to 51 in the prevention and/or treatment of a microbial infection.

70. Use of the prodrug as defined in any one of claims 38 to 51 as an antimicrobial agent.

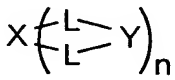
71. A prodrug as defined in any one of claims 38 to 51 or a formulation as defined in any one of claims 54 to 59 for use in the prevention and/or treatment of a microbial infection.

72. A method for the detection of a microbial infection which comprises the step of contacting the prodrug as defined in any one of claims 38 to 51 or the formulation as defined in any one of claims 54 to 59 with a sample suspected of containing the microorganism.

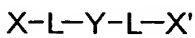
73. A prodrug of the general Formula (I), (II) or (III):



(I)



(II)



(III)

in which

X and X' are either the same or different and selected from a nucleoside, rhinovirus capsid-binding compound, antisense oligonucleotide, peptide, an inhibitor of HIVRT, an inhibitor of influenza neuraminidase, amphotericin β, an azole and an aspartic proteinase;

L is a linker group;

Y is a pharmacokinetic regulator; and

n is an integer of 1 or greater

or a pharmaceutically acceptable derivative or salt thereof.

74. A prodrug according to claim 73, in which the linker group is selected from esters, amides, ureas, thioureas, imines, acetals, ethers, phosphates, phosphate esters or diesters, thioesters, oximes and hydrazones.

75. A prodrug according to claim 74, in which the linker group is selected from an ester, amide, oxime and phosphate.

76. A prodrug according to claim 74 or claim 75, in which the linker group is an ester.

77. A prodrug according to any one of claims 73 to 76, in which the pharmacokinetic regulator is a hydrophobic or hydrophilic moiety.

78. A prodrug according to claim 77, in which the hydrophobic moiety is an optionally substituted straight chain, branched and/or cyclic saturated or unsaturated hydrocarbon.

79. A prodrug according to claim 78, in which the hydrophobic moiety is an optionally substituted alkyl or optionally substituted alkenyl having 1 to 24 carbon atoms which is optionally interrupted with oxygen or nitrogen; optionally substituted aryl; or an optionally substituted heterocyclyl.

80. A prodrug according to claim 79, in which the optionally substituted alkyl or optionally substituted alkenyl is optionally substituted C_{1-20} alkyl or optionally substituted C_{2-20} alkenyl which is optionally interrupted with O, C=O, NH, optionally substituted aryl or optionally substituted heterocyclyl and optionally substituted with carboxyl, optionally substituted C_{1-6} alkyl, amino or hydroxyl.

81. A prodrug according to claim 79, in which the optionally substituted aryl is an optionally substituted phenyl or optionally substituted biphenyl.

82. A prodrug according to claim 79, in which the optionally substituted heterocyclyl is a 5- or 6-membered nitrogen containing heterocyclic group.

83. A prodrug according to claim 82, in which the heterocyclic group is selected from pyridyl, indolyl, indazolyl, 2,3-dihydro-1H-indolyl, furanyl, isoxazolyl, pyrazolyl and thiofuranyl.

84. A prodrug according to any one of claims 81 to 83, in which the optional substituents on the phenyl or heterocyclyl are selected from halo, C_{1-4} alkyl, C_{1-4} alkoxy, hydroxy and OCF_3.

85. A prodrug according to claim 77, in which the hydrophilic moiety is selected from oligonucleotides up to 20 nucleotides in length, peptides up to 20 amino acids in length, peptide mimics, carbohydrates, oligosaccharides and derivatives thereof.

86. A method for the preparation of the prodrug as defined in any one of claims 73 to 85, which comprises the steps of:

(a) optionally protecting the moieties X and/or X' and/or the linker group which is attached to the optionally protected pharmacokinetic regulator Y;

(b) reacting the optionally protected moieties X and/or X' and the optionally protected linker group L attached to the optionally protected pharmacokinetic regulator Y; and

(c) if necessary, removing the protecting groups of the moieties X and/or X', the linker L and the pharmacokinetic regulator Y.

87. A pharmaceutical formulation comprising the prodrug as defined in any one of claims 73 to 85 or a pharmaceutically acceptable salt or derivative thereof, together with one or more pharmaceutically acceptable carriers.

88. A pharmaceutical formulation according to claim 87, which further comprises one or more other therapeutic and/or prophylactic ingredients.

89. A pharmaceutical formulation according to claim 88, in which the other therapeutic and/or prophylactic ingredient is an antimicrobial or antiinfective agent.

90. A pharmaceutical formulation according to claim 89, in which the antiinfective agent is an antibacterial agent.

91. A pharmaceutical formulation according to claim 90, in which the antibacterial agent is used to treat respiratory infections.

92. A pharmaceutical formulation according to claim 90 or claim 91, in which the antibacterial agent is a combination of trimethoprim and sulfonamide; bacitracin and polymyxin B-neomycin; imipenem and fluoroquinolone; and beta-lactam and aminoglycosides.

93. An inhaler which comprises a prodrug as defined in any one of claims 73 to 85 or a formulation as defined in any one of claims 87 to 92.

94. An inhaler according to claim 93 which is adapted for oral administration as a free-flow powder.

95. An inhaler according to claim 93 which is a metered dose aerosol inhaler.

96. A method for the prevention and/or treatment of a microbial infection comprising the step of administration to a subject in need thereof of an effective amount of the prodrug as defined in any one of claims 73 to 85 or a formulation as defined in any one of claims 87 to 92.

97. A method according to claim 96, in which the microbial infection is a viral, fungal, parasitic, yeast or protozoal infection.

98. A method according to claim 97, in which the viral infection is an orthomyxovirus or paramyxovirus infection.

99. A method according to claim 97 or claim 98 in which the viral infection is an influenza A or B infection, parainfluenza, mumps or Newcastle disease.

100. A method according to any one of claims 96 to 99 in which the administration is to the respiratory tract by inhalation, insufflation or intranasally or a combination thereof.

101. Use of the prodrug as defined in any one of claims 73 to 85 for the manufacture of a medicament for the prevention and/or treatment of a microbial infection.

102. Use of the prodrug as defined in any one of claims 73 to 85 in the prevention and/or treatment of a microbial infection.

103. Use of the prodrug as defined in any one of claims 73 to 85 as an antimicrobial agent.

104. A prodrug as defined in any one of claims 73 to 85 or a formulation as defined in any one of claims 87 to 92 for use in the prevention and/or treatment of a microbial infection.

105. A method for the detection of a microbial infection which comprises the step of contacting the prodrug as defined in any one of claims 73 to 85 or the formulation as defined in any one of claims 87 to 92 with a sample suspected of containing the microorganism.